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Regional Disparities in Europe

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Abstract

In the last decades, and particularly in the Nineties, The European Economy has been widely characterised by regional disparities. This paper aims to evaluate if different regional economic structures, such as productive mix and labour market composition, contribute to this disparities and to what extent they prevent the convergence and/or favour divergent clusters of regions. To this purpose we shall apply a multivariate analysis method, named STATIS, to a set of regional characteristic indicators that will allow us to estimate some latent factors which are able to measure the regional differences and their dynamic.

Keywords: European regional differences, Multivariate analysis, STATIS
Jel code: R11**,** R58, J60

Introduction

In recent years, because the disparities among regions prove significantly greater than those among countries, analysis of the causes of the socio-economic differences among the European regions has attracted increasing interest.

This strand of analysis has been prompted mainly by the fact that the creation of the European Union was based on the belief that a broader area of free trade would be a necessary and sufficient condition for economic welfare to spread uniformly among countries. The first question that arises is why theoretical explanations of regional differences fail to account satisfactorily for the European case in recent decades. Indeed, if the three theories – the neoclassical theory in both its ‘strong’ and ‘weak’ versions, the theory of endogenous development, and the ‘new geography’ approach – are taken to their extreme consequences, they point to the conclusion that regional differences are either bound to converge on a single development path in the long period (the neoclassical theory) or that they will diverge permanently, with the creation of strong polarization processes.[1] As we have said, the regions of Europe display not only persistent differences but also a dynamic whereby periods of slow convergence alternate with others in which the tendency is towards divergence (Tondl, 1997; Cuadraro Rura, 2001).

The second question concerns policy. That is, the problem arises as to which regional, national or European strategy is best able to accelerate the process of convergence among regions. Regional cohesion has always been a priority objective of the European Union, which has allocated huge amounts of economic resources (the European Social Fund and the Cohesion Fund) to its achievement. And regional cohesion has become even more topical as a result of recent developments in the process of

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[1] The literature on the subject is detailed and well known. Here we quote the valuable surveys by De la Fuente (2000) and the European Commission (2000).

European integration. The advent of the single currency and the financial stability constraints imposed by the Maastricht Treaty inhibit the pursuit of independent monetary policies and drastically reduce the autonomy of member-states as regards their fiscal policy: and all this at a time when enlargement of the EU towards the East will soon radically extend the regional scope of the problems of economic and social cohesion. This European policy approach has been subject to widespread criticism (Boldrin and Canova, 2001; de la Fuente, 1999; Canova, 2001; Davies and Hallet, 2002 and 2001; Edervee and Gorter, 2002; Martin, 1998) on the grounds that, as we have seen, it is not supported by the facts and is directed at regional contexts with extremely diverse socio-economic features.

Finally, analysis of convergence-divergence processes pays increasing attention to the institutional mechanisms that regulate the labour market, as well as to the characteristics of the labour supply and demand and their dependence on spatial factors (Niebhur, 2002). The excessive rigidity and the scant mobility (Blanchard and Katz, 1992; Decréssin and Fatas, 1995; Obstfeld and Peri, 1998) of the labour factor are judged to be the main causes of the intensification – or the persistence – of divergence among regions. In fact, as is well known, the variables used to assess convergence/divergence are measures generally tied to per capita GDP (Sala-i-Martin, 1996; Barro and Sala-i-Martin, 1991) and to its two components of employment rate and productivity. Econometric estimates unanimously agree that, in recent years in Europe, the convergence of per capita GDP has been very slow and has instead fostered the formation of clusters of homogeneous regions which are internally convergent but diverge with respect to each other, and this has been due exclusively to the trend in the employment rate and therefore to the characteristics of the labour market (Overman and Puga 2002; Combes and Overman, 2003; Daniele, 2002; Basile, de Nardis and Girardi, 2003; Kostoris Padoa Schioppa and Basile, 2002; Kostoris Padoa Schioppa, 1999).

Examination has consequently been made of a series of regional factors connected with the labour market, some that are often complementary but sometimes concomitant, and which may potentially create, maintain or intensify divergence among regions (Erlhost, 2000): the endowment of factors and ‘fundamentals’; the structure of the labour market – natural growth and the age composition of the population, the composition of the labour force (Genre and Gòmez-Salvador, 2002); migratory phenomena and commuting (Greenway, Upward and Wright, 2002); the employment level, gross regional product, market potentials, the sectoral mix (Marelli, 2003; Paci and Pigliaru, 1999; Paci, Pigliaru and Pugno, 2002); density and urbanization (Taylor and Bradley 1997); economic and social barriers, schooling levels – the institutional structure that regulates the goods and labour markets, or the composition of wages (Pench, Sestito and Frontini, 1999; Hyclack and Johnes 1987).

The aim of this paper is to apply a multivariate factorial analysis method (the STATIS method) which, we believe, lends itself well to verification of most of the phenomena just described. The STATIS method, in fact, enables the European regions to be ‘read’ on the basis of factors that sum up their main socio-economic characteristics, to group them into homogeneous clusters, and to examine their temporal dynamics. It can therefore be used to estimate whether structural features favour the formation of clusters of regions and whether these display a tendency to converge either to a single structure or instead to a multiplicity of socio-economic structures. On this basis, it is then possible to investigate a number of themes: among them, whether the criteria used by the European Union to identify the regions to be targeted by the Structural and Cohesion Funds refer to homogeneous or diversified realities, and therefore whether they require more appropriate instruments.

The second section provides a brief description of the STATIS method. In the third, the method is applied to the European regions and analysis is conducted of the characteristics of the main clusters of regions and of their dynamics over time. The concluding section provides a summary of the results.

1 Measuring disparities: three-way matrices

As we have seen, the disparities among regions (cases) can be studied on the basis of numerous indicators (variables), like per capita GDP, productivity and the employment rate, and they can also be measured in their temporal dynamics (time). The multidimensional nature of regional differences therefore lends itself well to analysis by means of multivariate analysis methods, and in particular by dynamic multivariate analysis.

We decided to apply the STATIS (*Structuration des Tables A Trois Indeces de la Statistique*) method. This is a dynamic multivariate method which enables analysis of multidimensional (multiway) phenomena expressible in the form of three-way matrices: cases *i*, variables *j*, time *t*. The method has been developed by Escoufier (1985), and it has found numerous applications in economics, in Italy as well (D'Ambra, 1986; Fachin and Vichi, 1993; Tassinari and Vichi, 1994). Moreover, it has already been used to explain the dynamics of disparities among the Italian provinces (Amendola, Caroleo and Coppola, 1997; Baffigi, 1999).

This technique of exploratory analysis is based on study of a three-way data matrix $X_{I,JT}$ obtained from the temporal succession of data matrices ${}_tX_{i,j}$ of the same order , where *i* is the statistical unit and *j* the variable, both of them relative to the period *t* (*i* = 1, 2...I; *j* = 1, 2...J; *t*=1, 2...T). The formula is:

$$? \;_{I,JT} \; ? \left\| {}_1X \quad {}_2X \quad {}_TX \right\|$$

which can be presented as

$$? \;_{iJT} \; ? \left\| \begin{array}{cccccccccccc} {}_1x_{11} & {}_1x_{12} & .. & {}_1x_{1j} & {}_2x_{11} & {}_2x_{12} & .. & {}_2x_{1j} & {}_tx_{11} & {}_tx_{12} & .. & {}_tx_{1j} \\ {}_1x_{21} & {}_1x_{22} & .. & {}_1x_{2j} & {}_2x_{21} & {}_2x_{22} & .. & {}_2x_{2j} & {}_tx_{21} & {}_tx_{22} & .. & {}_tx_{2j} \\ ... & ...... & .. & ...... & ...... & ...... & .. & ...... & ...... & ...... & .. & ...... \\ {}_1x_{i1} & {}_1x_{i2} & .. & {}_1x_{ij} & {}_2x_{i1} & {}_2x_{i2} & .. & {}_2x_{ij} & {}_tx_{i1} & {}_tx_{i2} & .. & {}_tx_{ij} \end{array} \right\|$$

From the three-way matrix thus constructed it is possible to derive (Rizzi, 1989):

1. the variance-covariance matrix

$$? _{JT,JT} \; ? \begin{Vmatrix} {}_1 ?^2 & {}_{12} ? & \cdots\cdots & {}_{1T} ? \\ {}_{12} ? & {}_2 ?^2 & \cdots\cdots & {}_{2T} ? \\ \cdots\cdots & \cdots\cdots & \cdots\cdots & {}_{pq} ? \\ {}_{1T} ? & {}_{2T} ? & {}_{pq} ? & {}_T ?^2 \end{Vmatrix}$$

where ${}_{pq} ?$ is the variance-covariance matrix between ${}_pX_{i,j}$ and ${}_qX_{i,j}$:

$${}_{pq} ? \; ? \; ?_p \hat{X}'_{i,j,q} \hat{X}_{i,j} ? \frac{1}{n}$$

where $\hat{X}$ is the deviation matrix and $1 ? p ? T$, $1 ? q ? T$.

The matrices on the main diagonal represent the variance-covariance matrices of the matrix $? _{I,JT}$ at time *t*, while ${}_{pq} ?$ measures the same relation between the variables relative to time *q* and time *j*.

2. The (TxT) square matrix, $I_{T,T}$ where each generic element $I_{p,q} \; ? \; tr({}_{pq} ?)$ corresponds to the trace of the relative submatrix ${}_{pq} ?$ of $? _{JT,JT}$

$$I_{T,T} \; ? \begin{Vmatrix} tr({}_{11} ?^2) & tr({}_{21} ?) & \ldots\ldots & tr({}_{1T} ?) \\ tr({}_{12} ?) & tr({}_{22} ?^2) & \ldots\ldots & tr({}_{2T} ?) \\ \ldots\ldots & \ldots\ldots & \ldots\ldots & tr({}_{pq} ?) \\ tr({}_{1T} ?) & tr({}_{2T} ?) & tr({}_{pq} ?) & tr({}_{TT} ?^2) \end{Vmatrix}$$

and is a measure of the dissimilarity between ${}_pX_{i,j}$ /and ${}_qX_{i,j}$.. The higher the value assumed by this index, the less the similarity between the structures of ${}_pX_{i,j}$ and / ${}_qX_{i,j}$.

Alternatively, one may assume as the index of similarity Escoufier's (1976) coefficient:

$$I^{*}_{p,q} \;?\; RV({}_{p}X_{i,j},{}_{q}X_{i,j}) \;?\; \frac{tr({}_{pq}?\,{}_{pq}?)}{\sqrt{tr({}_{p}?^{2})tr({}_{q}?^{2})}}$$

obtained by operating with matrices of deviations from the mean, and which have the characteristic of varying between 0 and 1. The coefficient, which can be considered a generalization of the Bravais correlation coefficient, is close to unity if the matrices have an almost identical structure.

2 The STATIS method

The STATIS method divides into three phases: *Interstructure*, *Compromise* and *Intrastructure*.

The purpose of the Interstructure phase is to identify a suitable vectorial space smaller than T, where the T occasions can be represented.

To this end, examination is made of the matrix $I_{T,T}$ (also called the interstructure matrix), the column vectors of which are assumed as characteristic elements of each of the T occasions. Constructed from this is a factorial subspace $?^{s}$ with $s < t$ generated by the s eigenvectors corresponding to the s largest eigenvalues of $I_{T,T}$. The subspace thus constructed yields the best representation of the T occasions because it is demonstrated that the matrix Q, of rank $s ? T$ – whose elements $Q_{(s)} \;?\; \sum_{a?1}^{s} ?_a u_a u_a^{'}$ are linear combinations of the first $?_a$ eigenvalues and u_a eigenvectors of the matrix $I_{T,T}$ - has the characteristic of minimizing the square of the Euclidean norm $??I\text{-}Q??^{2}$.

A first result is thus obtained. The T occasions with coordinates equal to $\sqrt{?_1 u_1}$, $\sqrt{?_2 u_2}$,..........$\sqrt{?_h u_h}$ can be generated in the factorial subspace $?^{s}$ by the first eigenvectors u_a.

It is also possible to calculate indices relative to the quality of the representation, and also relative to the contribution made by each of the *T* occasions:

- the ratio between the sum of the first *s* eigenvalues and the total of all the eigenvalues constitutes a measure of the percentage of total information contained in the space $?^{s}$;
- the ratio between the individual eigenvalue and the overall total measures the variability captured by the relative eigenvector;
- the square of the cosine of the angle formed by the factorial axis with the segment that joins the occasion-point with the origin is an index of the representation quality of the individual occasion from that axis;
- the proximity of two occasion-points in the space $?^{s}$ is an indicator of the similarity of the matrices.

In the *compromise* phase, a fictitious structure or synthesis matrix is identified which optimally summarizes the information contained in the *T* variance and covariance matrices. This structure, called 'compromise', is given by the matrix *W* obtained as a linear combination of the elements u_1 of the eigenvector of the matrix $I_{T,T}$ corresponding to the highest eigenvector and the matrices $?_t ?_t \hat{?}_t ?'$ (Escoufier, 1979, p. 113):

$$W ? \overset{T}{\underset{t?1}{?}} u_t ?_t$$

In the space plotted by the *s* eigenvectors corresponding to the first *s* eigenvalues of the matrix *W* it is possible to represent both the *j* variables and the median positions of each individual. The latter are derived from the diagonalization of matrix *W* obtained by identifying a matrix *M* such that *W* = *MM D* (where *D* is a diagonal matrix defined positive whose elements are the weights of the individuals, statistical units, $D ? \frac{1}{L} I$, with *L* equal to the number of individuals, and where *I* is an identity matrix.

In other words, matrix *W* is the best compromise, in the sense defined above, among the various representations that can be associated with each of the T matrices taken separately for each unit of time.

If $s = 2$, the representation occurs in a two-dimensional space corresponding to the first two factors identified. Obviously, this projection will be better, the greater the incidence of the first two eigenvectors on the trace of W.

In the intrastructure phase it is then possible to represent the trajectories followed in time by each individual in the factorial space thus identified. If only the first two eigenvalues are considered, the representation of the trajectories may occur in a space where the system of Cartesian axes is constituted by the eigenvectors a_1 a_1 and a_2 a_2, and where the coordinates on the first axis of each individual are given by $?_{1t} ? a_1 ?^{?0.5}$ and on the second axis by $?_{2t} ? a_2 ?^{?0.5}$.

3. Analysis and results

The aim of this paper, as said, is to analyse the medium-term dynamics of the performance of labour markets and economic structures in the European regions. Used to this scope it is the dynamic method for principal components analysis – the STATIS method – described in the previous section. This method enables identification of criteria with which to cluster regions in various years using a base information structure consisting, besides labour market variables, of indicators on income, composition of the population, and the sectoral structure of employment. It is thus possible to study the change over time in the territorial dimension of interactions between labour market and economic development, and to analyse how the various regional units in question relate to this evolution.

The variables used for this analysis are listed in Table 3.2. They are taken from the Eurostat REGIO database and the European regions database of Cambridge Econometrics Ltd. and they are, as said, indicators characteristic of the labour market and the production system (Wishlade and Yuill, 1997). Labour demand is measured by the unemployment rate on the total working-age population (TOT), while the labour supply is measured by the labour-force participation rate (TAT). The percentage of the long-term unemployed (ULR) is used as a proxy for the structural gap between labour demand and supply. The percentage of part-time employment (PTT) is used as a measure of the flexibility of the regional labour market.

The production system is represented by four variables corresponding to the percentages of employed persons in agriculture (AGR), industry (IND), traditional services – commerce, hotels and non-market services (GHM) – and advanced services – transport, financial services and others (IJA). This grouping of production sectors has been performed taking account of percentage variations in employment in individual sectors, and as regards services, of average labour productivity observed during the period examined. As Table 3.1 shows, between 1991 and 2001 in the European Union, the percentages of persons employed in agriculture and industry decreased, while they increased in the services sector. The latter divides sharply between advanced services, which recorded an average labour productivity above the European average, and traditional services, whose average productivity was instead below the European average.

The other variables considered are population density (DEN), as a proxy for the gravitational force of a region, and per capita income (PPS), which is the indicator most frequently used to represent regional disparities.

Table 3.1 Dynamics of employment and average labour productivity by production sector in the countries of the European Union. 1991-2000		
Sector	Percentage change in employment	Labour productivity (period average thousands of euros 1995)
Agriculture, Forestry and Fishing	-23.33	22,520
Other Manufacturing Activities (DD-DK)	-13.03	39,910
Textiles and Clothing (DB-DC)	-18.73	22,070
Electronics (DL)	-13.61	40,930
Transport Equipment (DM)	-15.70	46,580
Mining and Energy Supply (C+E)	-16.27	94,090
Food, Beverages and Tobacco (DA)	-8.44	47,960
Construction	-2.90	31,390
Fuels, Chemicals, Rubber and Plastic Products (DF-DH)	-7.20	64,410
Financial Services (J)	6.12	65,710
Other Financial Services (K)	33.75	62,710
Transport and Communications (I)	5.02	42,650
Non-market services	8.94	33,530
Wholesale and Retail (G)	11.44	29,070
Hotels and Restaurants (H)	20.59	25,730
TOTAL	4.48	39,760
Source: Our calculations on the Cambridge Econometrics Ltd database		

Tables 3.2 Variables used in the STATIS analysis			
N	Code	Variable	Index
1	DEN	Population density	Inhabitants /sq km
2	TAT	total activity rate	labour force/population aged over 15
3	TOT	employment rate	employed/population aged over 15
4	ULR	Long-term unemployment rate	long-term unemployed/total unemployed
5	PTT	part-time employment rate	part-time employed/total employed
6	AGR	percentage employment in agriculture	employed in agriculture/ total employed
7	IND	percentage employment in industry	employed in industry/total employed
8	GHM	percentage employment in traditional services	employed in retail trade, hotels and non-market services /total employed
9	IJA	percentage employment in advanced services	employed in transport, financial and other services/total employed
10	PPS	per capita income	per capita GDP in Purchasing Power Standard

The European regions represent 130 cases. The level of territorial disaggregation of the European regions selected was intended to cover the entire territory and to provide the maximum disaggregation possible with the data available. This level corresponds to the Nuts 2 level for Greece, Spain, France, Italy, Austria and Portugal; Nuts 1 for Belgium, Germany, Holland, Finland, the United Kingdom; Nuts 0 for Denmark, Ireland, Luxembourg and Sweden, for which countries there are no Nuts 1 and Nuts 2 disaggregations (or data are not available with which to perform such disaggregations)[2] (see Appendix). The time period is between 1991 and 2000.

The STATIS methodology, as said, consists in the analysis of the three-way matrix (tXij), where t denotes the temporal observations, i the regions, and j the variables , obtained by the succession of T matrices of the same dimensions.

As explained in the previous section, the analysis moves through three phases: interstructure, compromise and infrastructure. The output from the interstructure phase describes the structure of the *T* matrices in a vectorial space smaller than T. This is reduced to two dimensions but still maintains a good similarity to the initial representation. The compromise phase consists in the estimation of a synthesis matrix which yields a representation, in the two-dimensional space identified, of the characteristic indicators and of the average positions of the regions in the time-span analysed (1991-2000). The result of this intrastructure phase is a representation of the trajectories followed by the individual regions in the same period of time.

In order to evaluate the goodness of the factorial representation yielded by construction of the compromise matrix, Table 3,3 shows the first three highest eigenvalues and the percentage of the total variance explained by the first three factorial axes.

Table 3.3
Eigenvalues and inertia percentages of the factorial axes

Axis	Eigenvalue	Variance explained	Cumulated variance explained
1	3.75547	36.76	36.76
2	1.99895	19.56	56.32
3	1.18853	11.63	67.95

To be noted first is that 36.8% of the variance is explained by the first factor, and 19.6% by the second, for a total of 56.3% of the

[2] The complete list of the 130 regions is given in the Appendix.

variance expressed by the set of all the variables. In other words, the first factor alone explains more than one-third of the total variability, while the first three factors jointly explain almost 68%. Consequently, the reduction of the phenomenon's variability, obtained by representing it in a two-dimensional space, is a meaningful synthesis of the information considered.

Figures 3.1 and 3.2 show, respectively on the factorial plane generated by the first two and by the first and third principal components, the positions of the average annual value of each of the ten characteristic indicators considered.

In order to interpret the two figures, we may refer to Table 3.4, which shows that minimum and maximum period values of the correlations between the variables and the factorial axes. It will be seen that the variables most closely correlated with the first factor are, on the one hand (negative quadrant), the employment rate (TOT), the activity rate (TAT), the percentage of part-time employment (PTT), per capita income (PPS), and the percentage of employment in advanced services; and on the other (positive quadrant), the percentage of long-term unemployment (ULR), and the percentage of employment in agriculture (AGR). In other words, along the first axis one observes a clear polarization between the labour market indicators and those relative to the production structure.

Figure 3.1
Representation of the characteristic variables on the factorial axes. First and second factors

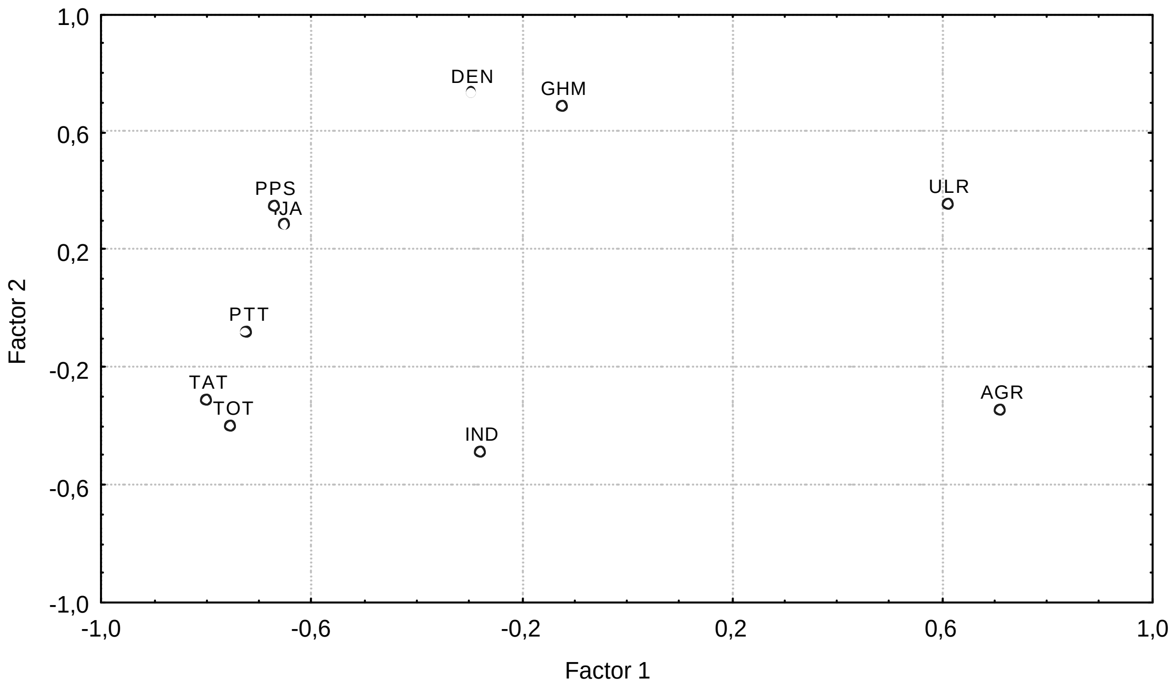
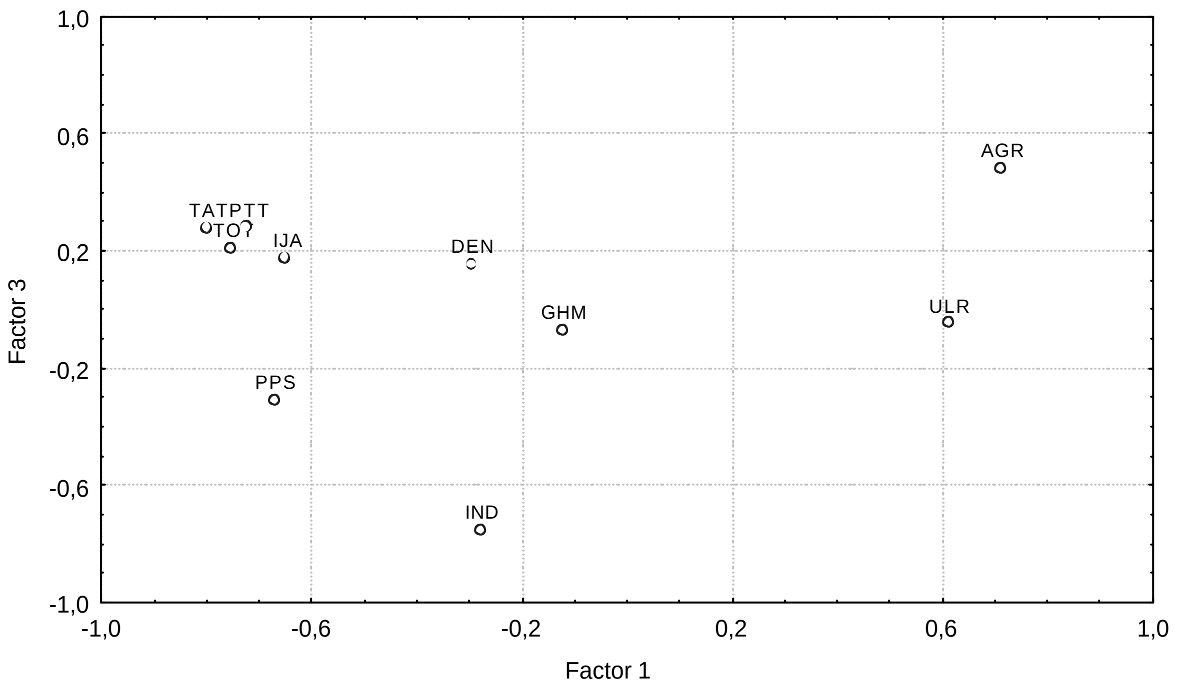


Figure 3.2
Representation of the characteristic variables on the factorial axes. First and third factors



Along the second axis one observes a close correlation among, on the one hand (positive quadrant), population density (DEB), per capita income (PPS), and the percentages of employment in traditional services (GHM) and advanced services (IJA), and on the other (negative quadrant), percentage of employment in industry (IND) and in agriculture (AGR), and the employment rate (TOT). In this case, we may state that the second axis identifies in marked manner only the phenomena representing variables located in the positive quadrant, namely those correlated with the territorial dimension. In fact, the indicators in this quadrant represent highly urbanized areas, or ones which contain rail or road infrastructures or sea ports, or with high levels of tourism. The negative quadrant, by contrast, comprises indicators which are more difficult to interpret and concern a mix of factors, such as low population density, the presence of agricultural employment, and high levels of industry.

The phenomenon of industrialization, however, is thrown in sharpest relief by the third factor. This latter, in fact, is closely correlated in the negative quadrant with the percentage of employment in industry (IND), while in the positive quadrant one finds, once again, a close correlation with variables denoting various characteristics: high percentage of employment in agriculture (AGR), but also a good labour market structure – high percentage of part-time employment (PTT), high employment rate (TOT), and high participation rate (TAT).

Table 3.4
Correlations between the variables and the factorial axes (minimum and maximum period values)

Factor 1			Factor 2			Factor 3		
	Min	Max		Min	Max		Min	Max
TAT	-0.83	-0.75	IND	-0.51	-0.47	IND	-0.77	-0.71
TOT	-0.78	-0.72	TOT	-0.42	-0.37	PPS	-0.36	-0.27
PTT	-0.76	-0.69	AGR	-0.36	-0.34	ULR	-0.18	0.07
PPS	-0.69	-0.63	TAT	-0.34	-0.30	GHM	-0.09	-0.04
IJA	-0.66	-0.64	PTT	-0.11	-0.03	TOT	0.14	0.25
IND	-0.34	-0.22	IJA	0.27	0.30	IJA	0.14	0.20
DEN	-0.30	-0.29	ULR	0.30	0.38	DEN	0.15	0.16
GHM	-0.17	-0.07	PPS	0.33	0.36	TAT	0.19	0.32
ULR	0.58	0.64	GHM	0.64	0.73	PTT	0.21	0.33
AGR	0.70	0.72	DEN	0.73	0.73	AGR	0.47	0.49

Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database

Figure 3.3
Representation of the characteristic variables on the factorial axes. First and second factors

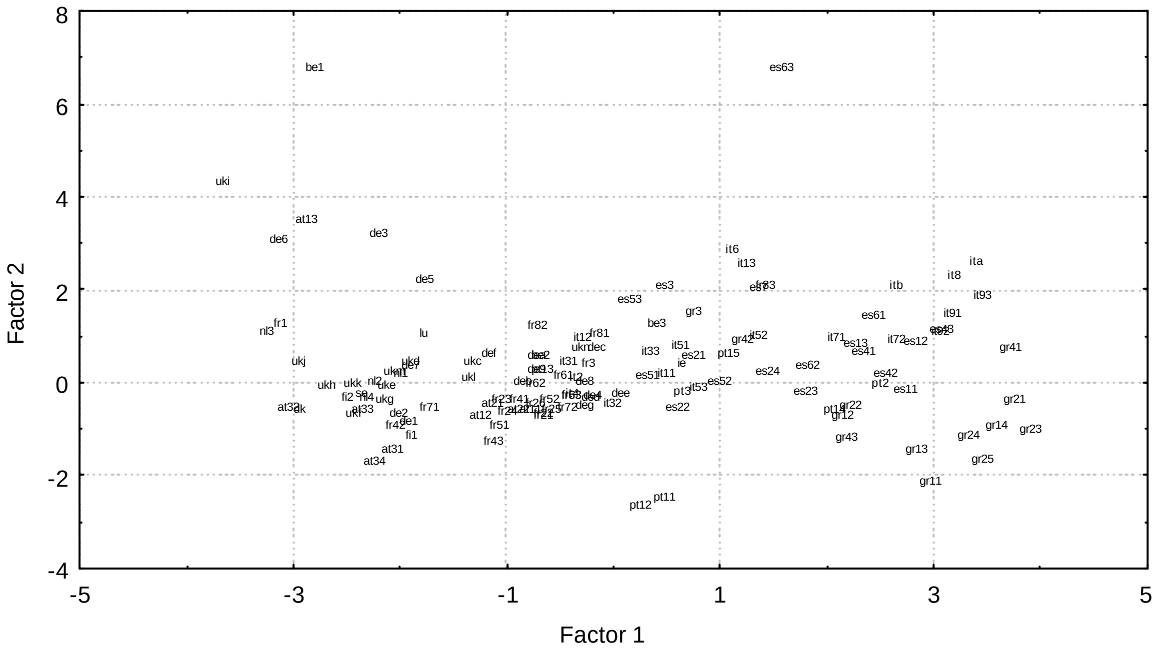
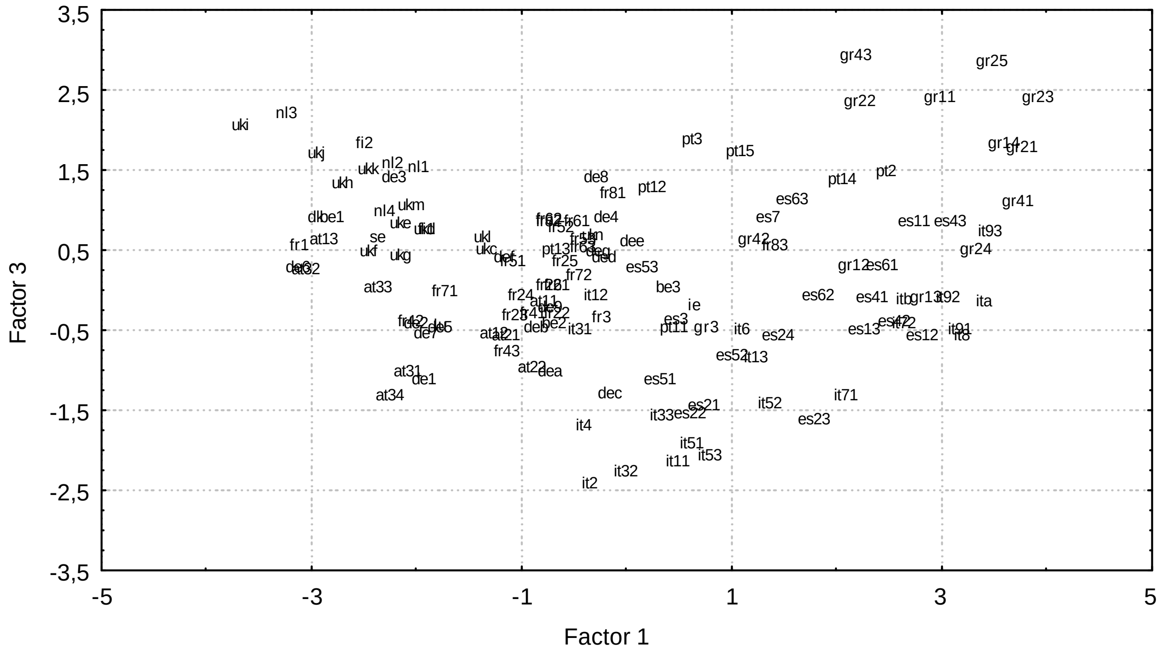


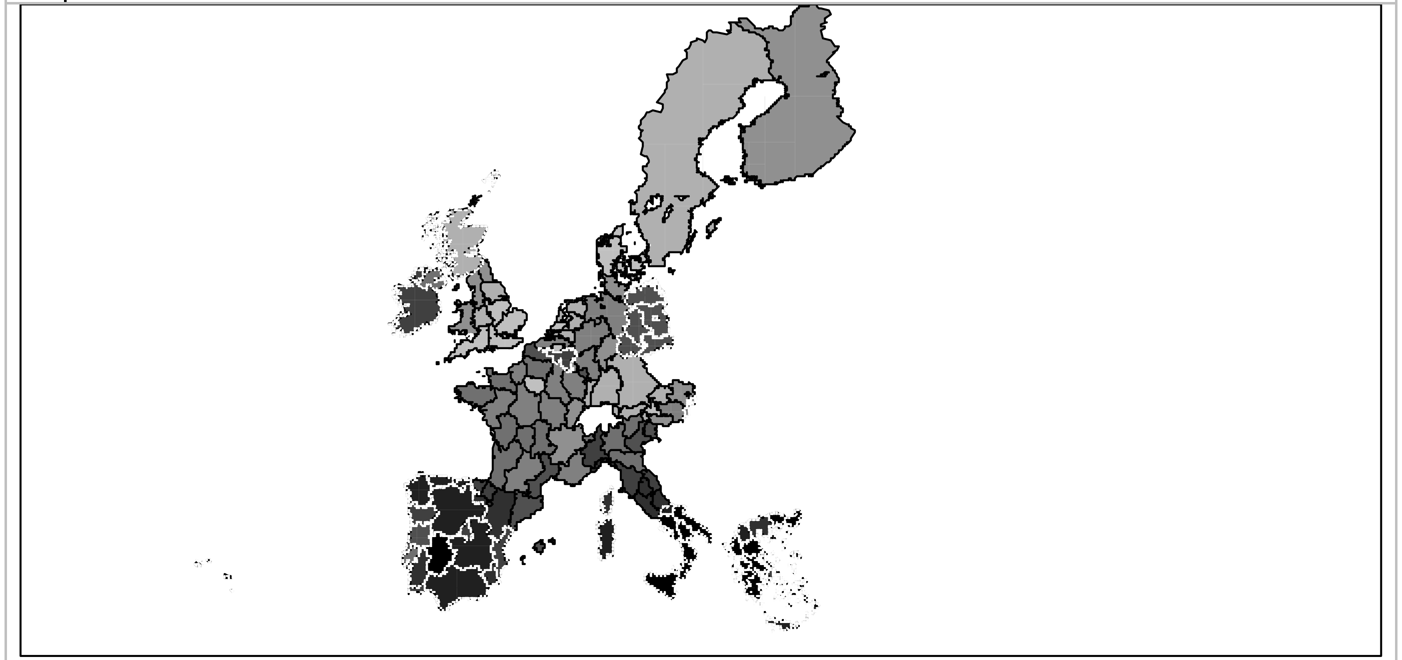
Figure 3.4
Representation of the characteristic variables on the factorial axes. First and third factors



Figures 3.3. and 3.4 show the European regions on, respectively, the first two factorial axes and the first and the third. In this case, too, in order to interpret the figures we may refer to maps 3.5, 3.6 and 3.7, where the regions are given colours which diminish in intensity according to their position along the factorial axis from positive to negative. Moreover, in order to enable further comparison, the borders of the Objective 1 regions have been outlined in white. It will be seen from Figure 3.5, which shows the positions of the regions along the first factor, there is a marked contrast between the majority of the Objective 1 regions, which lie in the positive quadrant of the axis and are therefore characterized by high structural unemployment and/or a high percentage of employment in agriculture, and the central-northern regions of Europe and of central-southern England, which are characterized by dynamic labour markets producing high levels of employment and participation, and with pronounced institutional flexibility. Occupying an intermediate position are the majority of the French regions and those of northern Italy and north-western Germany, which may have both dynamic labour markets and a high proportion of employment in agriculture, or even high percentages of long-term unemployment. Also to be emphasised is that large part of these latter regions, together with those of East Germany and Ireland, and some Spanish regions, contribute to a minimal extent (< 0.09%) to the formation of the first factor. We may therefore conclude that the Objective 1 regions, especially those of the Mediterranean basin and central-northern Europe, distinctively characterize the first factor.

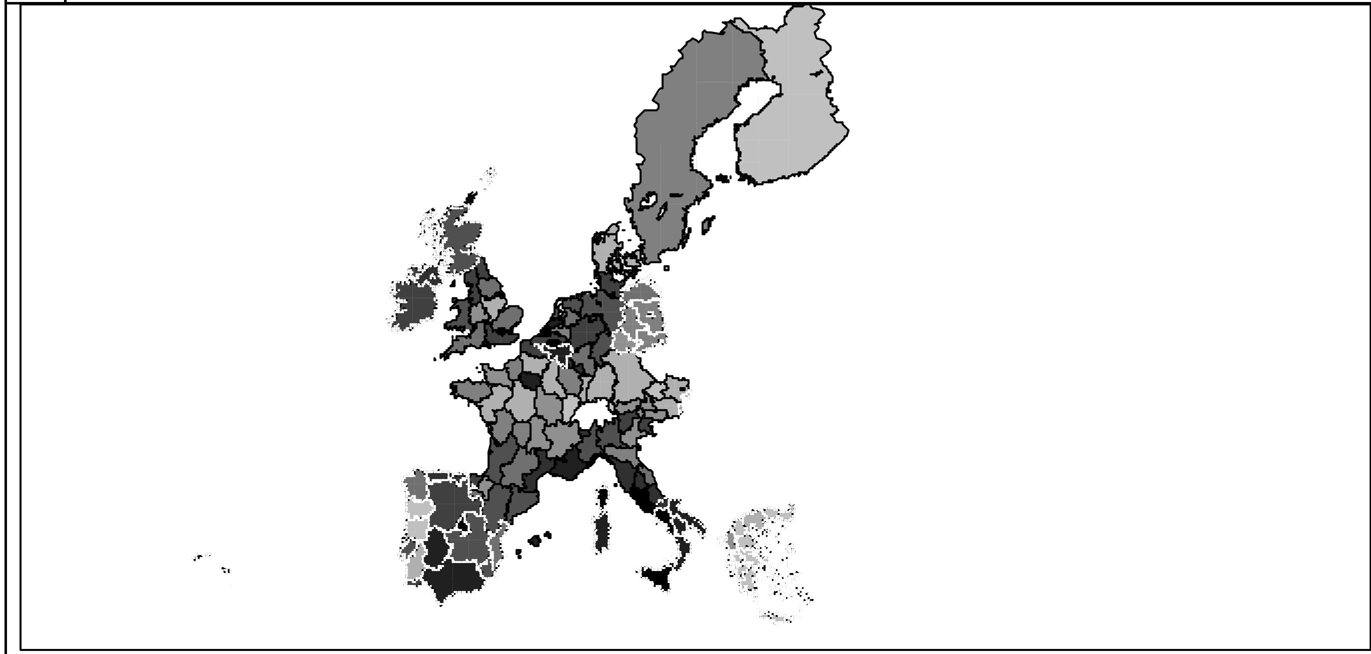
The positions of the regions along the second factorial axis are much more diversified. As said, the regions lying in the positive quadrant are those associated with localization factors (high population density, employment in services, and high incomes), while the characterization of the regions in the negative quadrant is less clear-cut. In fact, it will be seen in Figure 3.6 that the regions with the darkest colouring in the first quadrant are those which comprise the main European capital cities, important transport infrastructures, or with particularly developed tourist industries.

Figure 3.5
Map of the First Factor



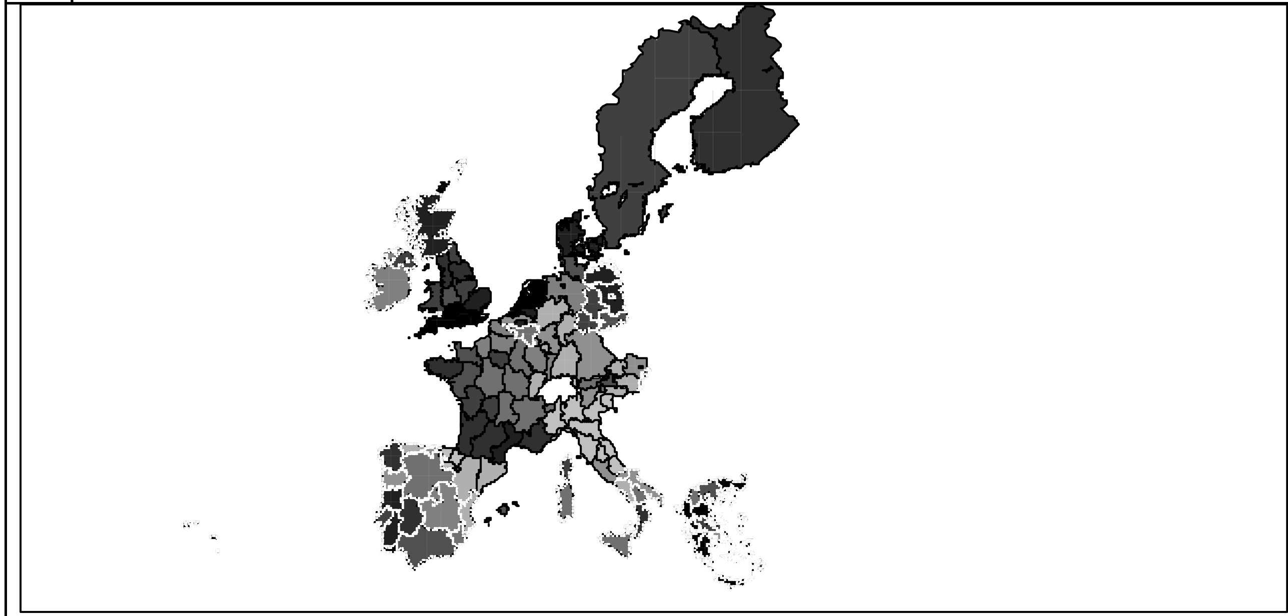
Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database
The borders of the Objective 1 regions are outlined in white

Figure 3.6
Map of the Second Factor



Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database
The borders of the Objective 1 regions are outlined in white

Figure 3.7
Map of the Third Factor



Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database
The borders of the Objective 1 regions are outlined in white

Also as regards the third factor, clear interpretation can only be made of the positions of the regions located in one of the two quadrants: in this case the negative one, which is characterized by indices of high levels of industrialization. In fact, the regions with the lightest colouring are those that can be associated with a high percentage of industrial employment: the central and north-eastern regions of Italy, the regions of central Germany, Austria, and the north-eastern regions of Spain.

A further result of the intrastructure phase analysis concerns the temporal trajectories followed by individual regions along the factorial axes and which highlight certain characteristics of the regional dynamic. A summary of these phenomena is provided by Tables 3.5 and 3.6, which show – for each year and only for the first two factors – the sum of the square of the distances between the individual regions and the factorial axis, weighted for the region's contribution to formation of that axis. In this way greater importance is given to the paths followed by the regions making the greatest contribution to defining the factor. The distances have been separately calculated for all regions, for those considered to be the core regions, for those in the EU periphery (cf. Basile and Kostoris Padoa Schioppa, 2002), and for the subgroup of the Objective I regions.

A first general phenomenon to be observed is that whilst for factor 1 the total distance increased during the decade for all the groups of regions considered, it diminished for factor 2. This seems to indicate that the regions gradually moved closer to the phenomena characterizing the second factor.

A second feature to be noted is that the distances of the core regions from both axes are much smaller than are those of the peripheral regions (and of the Objective 1 regions, to which category most of them belong). This means that the former are concentrated much more towards the centre of the axes, and therefore display a certain amount of homogeneity, while the latter lie more towards the extremes, and therefore display a greater structural characterization.

The third feature to stress is that the pattern of the distances is prevalently cyclical. The distances from the first factor are marked by shocks (1993, 1997, 2000) followed by slow and only partial recoveries in subsequent years, whereas as regards the second factor, the shocks are less pronounced and the dynamic is more constant. In the latter case, moreover, the core regions display a pattern opposite to that of the others: in fact their distances, with the exception of the final three years, tend to increase.

Table 3.5 Weighted average annual distances of the regions from the First Factorial Axis								
Year	All the Regions	Index Number '91=100	Objective 1	Index Number '91=100	Core	Index Number '91=100	Periphery	Index Number '91=100
1991	6,86	100,00	4,31	100,00	2,36	100,00	4,50	100,00
1992	7,06	102,99	4,48	104,05	2,38	100,83	4,69	104,22
1993	7,74	112,85	4,91	114,13	2,59	109,80	5,15	114,44
1994	7,34	107,01	4,62	107,20	2,49	105,54	4,85	107,78
1995	7,64	111,41	4,73	109,75	2,54	107,80	5,10	113,33
1996	7,54	110,03	4,72	109,61	2,60	110,46	4,94	109,78
1997	8,11	118,22	5,07	117,69	2,86	121,31	5,25	116,67
1998	7,72	112,54	4,72	109,52	2,78	118,03	4,94	109,78
1999	7,77	113,36	4,83	112,05	2,72	115,48	5,05	112,22
2000	8,12	118,47	5,14	119,31	2,70	114,62	5,42	120,44
Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database								

Table 3.6
Weighted average annual distances of the regions from the Second Factorial Axis

Year	All the Regions	Index Number '91=100	Objective 1	Index Number '91=100	Core	Index Number '91=100	Periphery	Index Number '91=100
1991	9,79	100,00	8,01	100,00	1,71	100,00	8,08	100,00
1992	9,70	99,06	7,83	97,67	1,80	105,30	7,90	97,74
1993	9,43	96,26	7,49	93,42	1,86	109,23	7,56	93,52
1994	9,23	94,28	7,38	92,13	1,76	103,37	7,47	92,36
1995	9,05	92,41	7,22	90,14	1,74	101,78	7,31	90,44
1996	8,65	88,37	6,79	84,78	1,79	104,87	6,86	84,89
1997	9,17	93,66	7,29	91,00	1,81	105,77	7,37	91,10
1998	8,97	91,64	7,23	90,28	1,65	96,81	7,32	90,55
1999	8,58	87,65	6,85	85,47	1,66	97,01	6,93	85,67
2000	7,69	78,57	6,04	75,35	1,60	93,64	6,10	75,39

Source: Our calculations on Eurostat REGIO data and on the Cambridge Econometrics database

4. Summary and conclusions

The results of the analysis confirm the thesis of those who contend that the European economy is a diversified reality influenced by structural phenomena concerning labour market characteristics, sectoral composition, and localization factors which make it unlikely that integration processes – although accelerated by the enlargement of markets and their greater efficiency – will give rise to the hoped-for levelling of economic development in the near future. The main reason for regional differences still seems to be the composition and structure of labour market. To be noted in particular is the marked contrast between the Mediterranean regions, most of which belong to the Objective 1 regions, and their high rates of structural unemployment, and the regions of central-northern Europe and central-southern England characterized by more flexible labour markets and high employment rates.

However, there are other phenomena responsible for regional disparities in Europe: localization factors (large conurbations, transport hubs, and tourism) which foster the development of connected service activities, and the presence of a solid industrial base accompanied by high levels of income and employment. These factors are associated with regions which are more territorially dispersed and therefore unlikely to form regional clusters, whilst, by contrast, industrialization phenomena are distributed across a transnational area formed by contiguous regions. This area stretches eastwards from the north-eastern regions of Spain along the Adriatic and through north-eastern Italy, and then northwards to the central regions of Europe, Austria and Germany. The dynamic analysis has shown not so much convergence as slow change in the structural characteristics that differentiate the regions of Europe, where localization factors and sectoral composition will probably be more influential in the future. Moreover, the peripheral regions seem to be more markedly characterized by structural differences than are the core regions.

Appendix

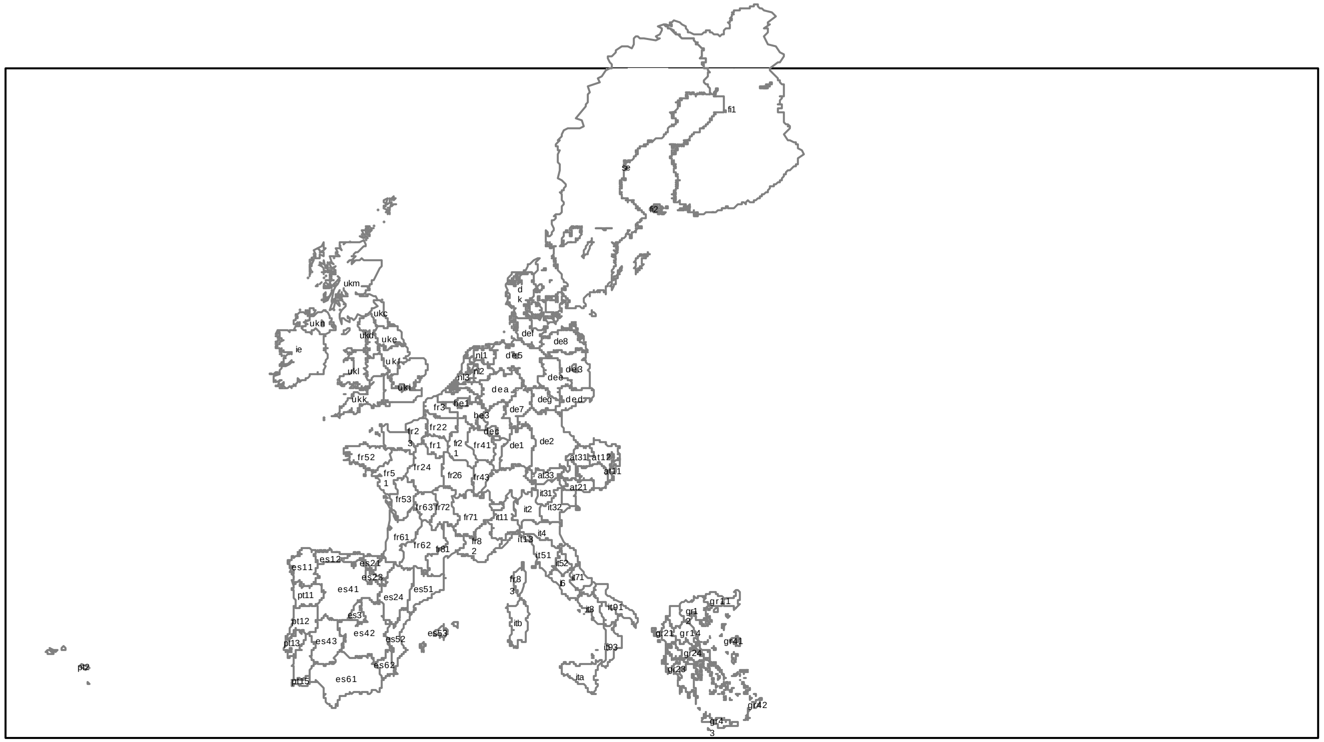
Table A.1
List of the 130 European regions used in the STATIS analysis. The country in which they are located and the corresponding NUTS level are indicated in bold.

sigla	Regioni	sigla	Regioni
	Belgium – NUTS 1 – Regions		
be1	Région Bruxelles-capitale/Brussels hoofdstad gewest	be2	Vlaams Gewest
be3	Région Wallonne		
Dk	**Denmark – NUTS 0 – Nation**		
	Federal Republic of Germany (including ex-GDR from 1991) - NUTS 1 – Lander		
de1	Baden-Württemberg	de2	Bayern
de3	Berlin	de4	Brandenburg
de5	Bremen	de6	Hamburg
de7	Hessen	de8	Mecklenburg-Vorpommern
de9	Niedersachsen	dea	Nordrhein-Westfalen
deb	Rheinland-Pfalz	dec	Saarland
Ded	Sachsen	dee	Sachsen-Anhalt
Def	Schleswig-Holstein	deg	Thüringen
	Greece – NUTS 2 – Development regions		
gr11	Anatoliki Makedonia, Thraki	gr12	Kentriki Makedonia
gr13	Dytiki Makedonia	gr14	Thessalia
gr21	Ipeiros	gr22	Ionia Nisia
gr23	Dytiki Ellada	gr24	Sterea Ellada
gr25	Peloponnisos	gr3	Attiki
gr41	Voreio Aigaio	gr42	Notio Aigaio
gr43	Kriti		
	Spain – NUTS 2 – Comunidades autonomas		
es11	Galicia	es12	Principado de Asturias
es13	Cantabria	es21	Pais Vasco
es22	Comunidad Foral de Navarra	es23	La Rioja
es24	Aragón	es3	Comunidad de Madrid

es41	Castilla y León	es42	Castilla-la Mancha
es43	Extremadura	es51	Cataluña
es52	Comunidad Valenciana	es53	Baleares
es61	Andalucia	es62	Murcia
es63	Ceuta y Melilla (ES)	es7	Canarias (ES)
	France – NUTS 2 – Régions		
fr1	Île de France	fr21	Champagne-Ardenne
fr22	Picardie	fr23	Haute-Normandie
fr24	Centre	fr25	Basse-Normandie
fr26	Bourgogne	fr3	Nord - Pas-de-Calais
fr41	Lorraine	fr42	Alsace
fr43	Franche-Comté	fr51	Pays de la Loire
fr52	Bretagne	fr53	Poitou-Charentes
fr61	Aquitaine	fr62	Midi-Pyrénées
fr63	Limousin	fr71	Rhône-Alpes
fr72	Auvergne	fr81	Languedoc-Roussillon
fr82	Provence-Alpes-Côte d'Azur	fr83	Corse
Ie	**Ireland – NUTS 0 – Nations**		
	Italy – NUTS 2 – Regioni		
it11	Piemonte	it12	Valle d'Aosta
it13	Liguria	it2	Lombardia
it31	Trentino-Alto Adige	it32	Veneto
it33	Friuli-Venezia Giulia	it4	Emilia-Romagna
it51	Toscana	it52	Umbria
it53	Marche	it6	Lazio
it71	Abruzzo	it72	Molise
it8	Campania	it91	Puglia
it92	Basilicata	it93	Calabria
Ita	Sicilia	itb	Sardegna
Lu	Luxembourg		
	Netherlands – NUTS 2 – Provincies		
nl1	Noord-Nederland	nl2	Oost-Nederland
nl3	West-Nederland	nl4	Zuid-Nederland
	Austria – NUTS 0 – Bundesländer		
at11	Burgenland	at12	Niederösterreich
at13	Wien	at21	Kärnten
at22	Steiermark	at31	Oberösterreich
at32	Salzburg	at33	Tirol

at34	Vorarlberg		
	Portugal - NUTS 0 - NUTS 2 groupings		
pt11	Norte	pt12	Centro (P)
pt13	Lisboa e Vale do Tejo	pt14	Alentejo
pt15	Algarve	pt2	Açores (PT)
pt3	Madeira (PT)		
	Finland- NUTS 1 – Manner-Suomi/Ahvenanmaa		
fi1	Manner-Suomi	fi2	Åland
se	**Sweden- NUTS 0 – Nation**		
	United Kingdom –NUTS 1 – Nation		
ukc	North East	ukd	North West (including Merseyside)
uke	Yorkshire and The Humber	ukf	East Midlands
ukg	West Midlands	ukh	Eastern
uki	London	ukj	South East
ukk	South West	ukl	Wales
ukm	Scotland	ukn	Northern Ireland

Map of the European regions with the relative abbreviations



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